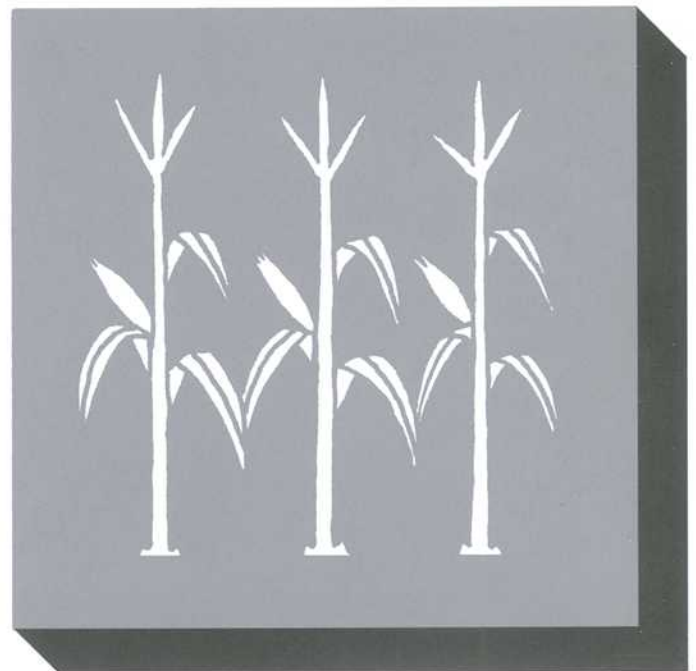
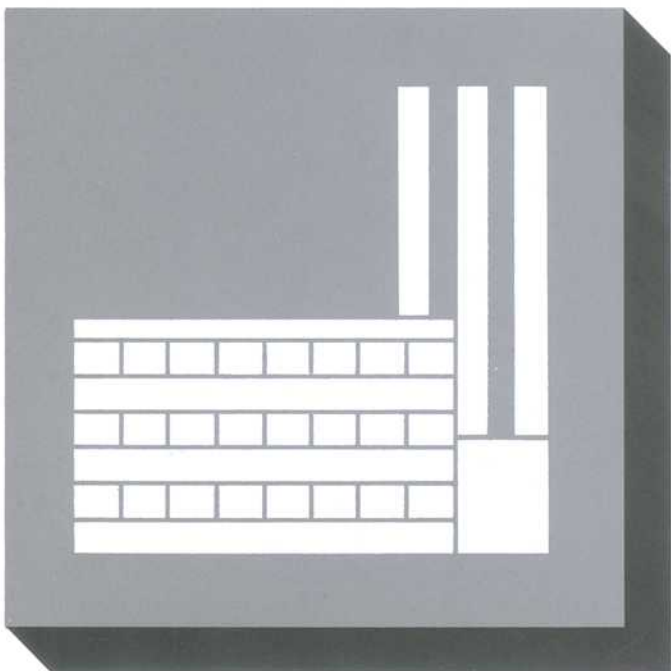
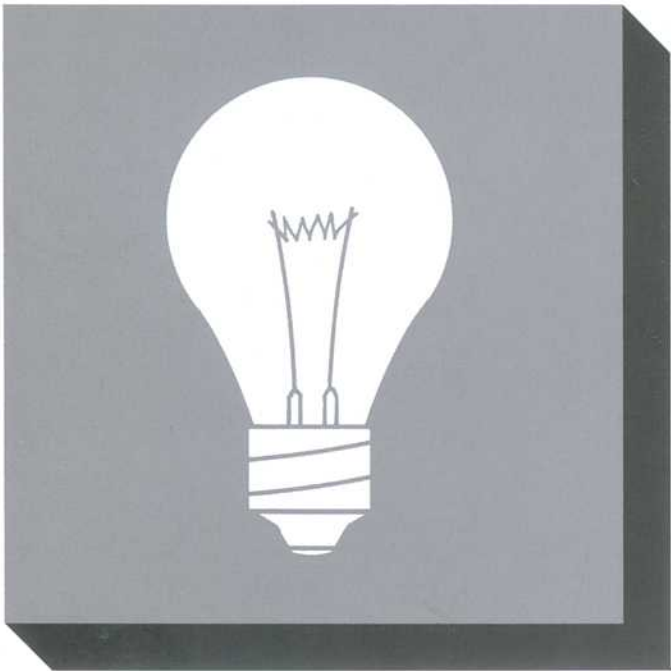


INDIANA'S

WATER USE 1990



WATER MANAGEMENT PROGRAM

The continuing demands on Indiana's water resources have brought about an emphasis on conducting an accurate inventory of water use in the state. This type of data will make it possible to analyze current water use trends and to help in the planning for future water use in the state. In addition, the inventory will serve as a tool for helping to determine areas of potential water use conflicts or for evaluating areas for future water resource development. "Indiana's Water Use 1990" is a continuation of a series of reports that attempts to give an overview of the water use data collection program.

The Indiana Department of Natural Resources, Division of Water, has been conducting an inventory of the state's significant water withdrawals since 1984. Indiana Code 13-2-6.1 (Water Resources Management Act) mandates that the owners of all wells and surface water intakes register with the Division of Water if their pumping facilities have the capacity of withdrawing 100,000 gallons or more of water per day. This would be equivalent to a pump capacity of approximately 70 gallons per minute. The law pertains to both stationary and portable pumps. Registration requirements are based on pump capability, not actual water use. In some cases water use may be less than 70 gallons per minute.

Registered significant water withdrawal facilities have been divided into six general water use categories: 1) Energy Production (power generation, coal preparation, heating and cooling); 2) Industrial (process and cooling water, sand and gravel operations); 3) Public Supply (water works, mobile home parks, schools); 4) Agricultural (irrigation, golf course, field drainage); 5) Rural Use (livestock watering and fish hatcheries); and 6) Miscellaneous (snow-making, fish and wildlife areas, lake-level maintenance).

Since the passage of the Water Resource Management Act in 1983, more than 3,500 significant water withdrawal facilities have been registered with the Division of Water. By the end of 1990, there were 3,119 active registrations on file including 4,710 wells and 1,398 surface intakes. The breakdown of active registered facilities for 1990 by water use category is shown in Figure 1.

REGISTRATION AND REPORTING

In 1990, 212 new significant water withdrawal facilities were registered with the Division of Water. New registrants for 1991 are expected to exceed or equal this number. By the time they registered, the majority of the new facilities had been in operation for more than the "90 day" time period that is allotted by law for registration of a significant water withdrawal facility. Prior to registration they were, therefore, in violation of the law. In many cases, facility owners have not registered because they are not aware of the state's registration program. Various methods have been implemented to publicize the program including letter mailouts, field inspections, and the utilization of conservation officers from the Division of Law Enforcement. As the inventory process continues, more significant facilities will be accounted for, thus making data on Indiana's water use more complete.

The annual reporting of actual water withdrawals by registered facilities is mandated by the Water Resource Management Act. Presently, approximately 25% of the registered facilities utilize flow meters for measuring water withdrawals and the remaining 75% estimate their withdrawal amounts. Although metering is not uniformly mandated for all facilities, it is required in those cases where the accuracy of the estimated data is questionable. In recent years, several steps have been taken to ensure that estimating techniques conform to the Division's guidelines. One example of this is the use of an ultrasonic flow meter which staff members of the Division of Water, in cooperation with the U.S. Geological Survey, have been trained to use. The ultrasonic flow meter is a portable, non-invasive (clamp on) device that allows for the determination of flow rates where the capacity of a pump is unknown or the reported rate may be inaccurate. This device has allowed Division of Water staff to assist some new registrants in the determination of their pumping capacities, thereby increasing the accuracy of the reported water use for those facilities. More measures will be taken in the future to improve the accuracy of reported water use data.

(FIGURE 1)

CATEGORY	# OF REGISTRATIONS	# OF WELLS	# OF INTAKES
AGRICULTURAL	1675	1552	792
PUBLIC SUPPLY	712	1905	111
INDUSTRIAL	516	910	289
ENERGY PRODUCTION	113	192	153
MISCELLANEOUS	86	114	45
RURAL USE	17	37	8

1990 REGISTRATION INFORMATION

WATER WITHDRAWAL DATA

During 1990, owners of 3,119 registered facilities reported total water withdrawals of about 3.38 trillion gallons. This total represents an increase of .12 trillion gallons compared to reported 1989 water withdrawals. The total registered energy production and industrial categories combined for about 92% of the state's total reported water withdrawals. Fifteen of these energy production and industrial water users actually accounted for 76% of the state's total.

The 3.38 trillion gallons of water withdrawn in 1990 constituted about 42% of the total registered capacity in the state. This registered capacity is based on information provided by the owner concerning the gallon per minute rating of their wells or surface intakes. This does not account for the actual aquifer or stream water supply potential. The combined withdrawal capability of all registered facilities was 22.0 billion gallons per day (BGD). Of this total capability, 18.6 BGD were from surface water sources and 3.4 BGD were from ground water sources. Figure 2 shows registered capacity for each water use category.

Of the reported water withdrawn for all six categories for the year, surface water withdrawals accounted for 3.2 trillion gallons (95%). The remaining 0.18 trillion gallons (5%) were withdrawn from ground water sources. Surface water withdrawals from Lake Michigan and the Ohio River accounted for approximately two-thirds of the total reported water withdrawals in the state.

Reported ground water withdrawals averaged 0.48 BGD for 1990 with 90% of the ground water withdrawals occurring from unconsolidated formations (i.e., sand and gravel). The remaining 10% of the registered ground water withdrawals were from bedrock formations. Although only a small portion of 1990's ground water was withdrawn from bedrock formations, these types of wells can produce large amounts of water in certain areas of the state. 1990 water withdrawals are shown by water use category in Figure 2.

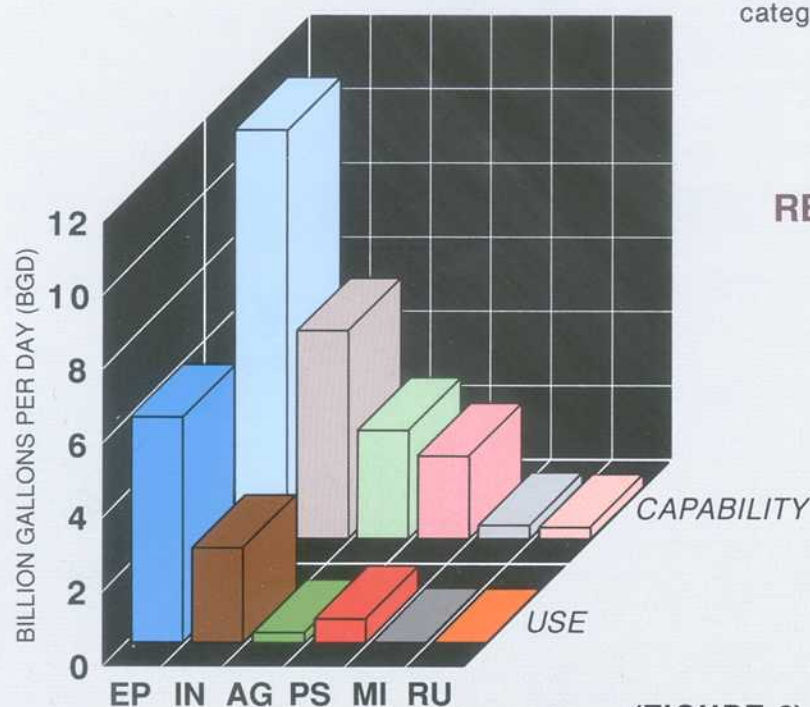
CATEGORY INFORMATION

Almost 99% of the water withdrawn in the energy production category was by coal-fired power plants which use water for cooling purposes. It is estimated that about 98% of water withdrawn in this category is returned to its source and is available for re-use within a few days. The major sources of cooling water for electric generating plants are Lake Michigan and the Ohio, Kankakee, Wabash, East Fork White, and West Fork White rivers. The remaining 1% of water withdrawn in the energy production category was related to coal mining and to heating and air conditioning.

Many industrial water users purchase water from public utilities while others have developed their own water supplies. According to the U.S. Geological Survey, Indiana ranks among the highest industrial self-supplied water users in the nation. In 1990, water withdrawals by self-supplied industries in Indiana averaged 2,517 MGD, 95% of which were from surface water sources. Surface water withdrawals from Lake Michigan in Lake and Porter counties accounted for approximately 74% of the total water withdrawn by self-supplied industries in Indiana.

During 1990, withdrawals in the public supply category averaged 621 MGD. Of this total, 333 MGD were taken from surface water sources and 288 MGD were pumped from ground water supplies. About 97% of the total water withdrawn in this category was taken by public water supply utilities which serve approximately 70% of Indiana's population. The remaining 3% of the total was withdrawn by mobile home parks, schools, hospitals, motels, restaurants, and other facilities which have developed their own supplies for drinking and/or sanitary purposes.

Reported withdrawals in the agricultural category during 1990 averaged 240 MGD. This total is 140 MGD less than the total agricultural withdrawals during 1989. This difference is due largely to the increase in precipitation in the state during 1990. (These average values are based on a 90-day irrigation season). Greene County reported the highest overall pumpage in the agriculture category due to withdrawals for field drainage. For more information concerning these categories refer to Figures 3 through 7.



(FIGURE 2)

REPORTED USE VS. REGISTERED CAPABILITY

EP=ENERGY PRODUCTION
IN=INDUSTRIAL
AG=AGRICULTURAL
PS=PUBLIC SUPPLY
MI=MISCELLANEOUS
RU=RURAL

ENERGY PRODUCTION CATEGORY

AVERAGE DAILY WITHDRAWALS

TOTAL = 6,034 MGD
GROUND = 28 MGD
SURFACE = 6,006 MGD

TOP THREE COUNTIES (1990 WITHDRAWALS)

- 1) JEFFERSON
- 2) LAKE
- 3) DEARBORN

REGISTRATION INFORMATION

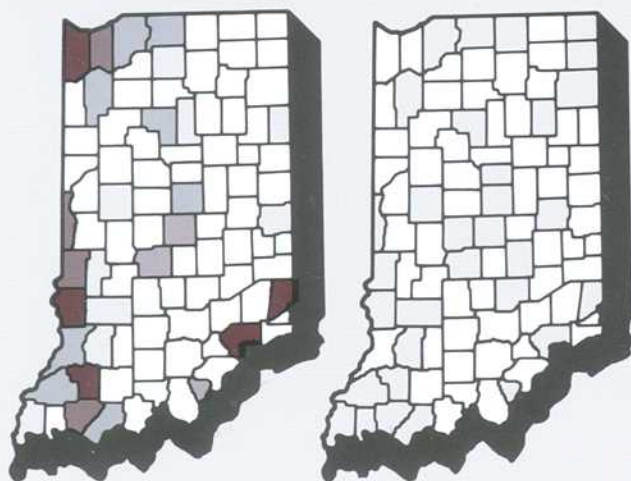
NUMBER OF FACILITIES = 113
NUMBER OF WELLS = 192
NUMBER OF INTAKES = 153

WITHDRAWAL INFORMATION

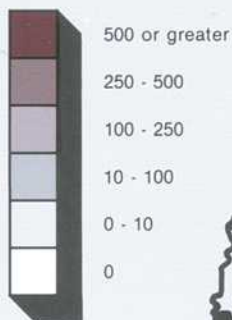
COAL FIRED POWER PLANTS = 99%
COAL MINING, HEATING & AIR CONDITIONING = 1%

SURFACE WATER

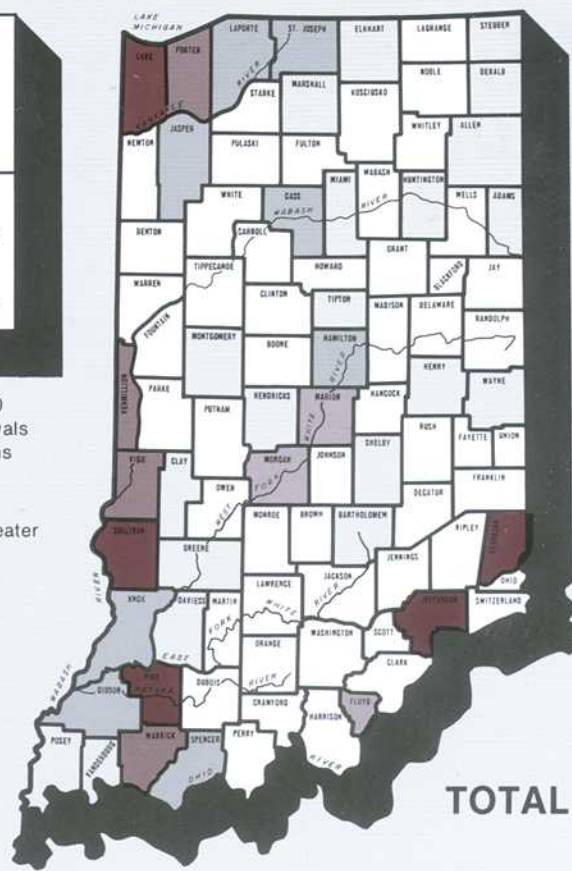
GROUND WATER



Average 1990
Water Withdrawals
(million gallons
per day)



(FIGURE 3)



TOTAL

INDUSTRIAL CATEGORY

AVERAGE DAILY WITHDRAWALS

TOTAL = 2,526 MGD
GROUND = 121 MGD
SURFACE = 2,405 MGD

TOP THREE COUNTIES (1990 WITHDRAWALS)

- 1) LAKE
- 2) PORTER
- 3) WARRICK

REGISTRATION INFORMATION

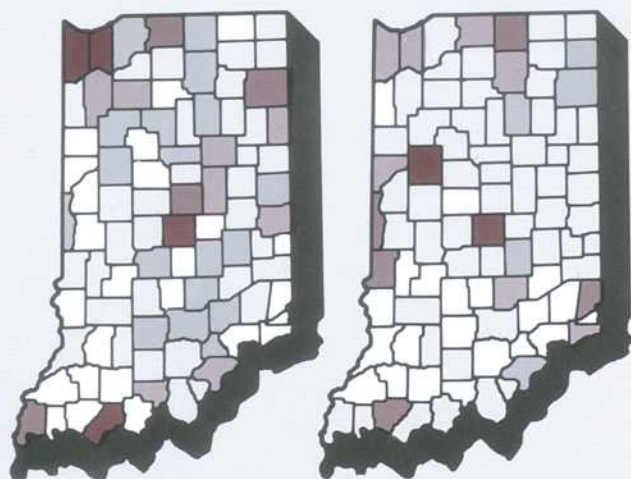
NUMBER OF FACILITIES = 516
NUMBER OF WELLS = 910
NUMBER OF INTAKES = 289

WITHDRAWAL INFORMATION

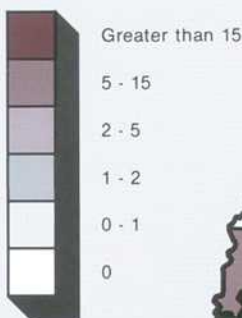
METAL INDUSTRY = 84.7%
PETROLEUM INDUSTRY = 5.6%
MINERAL EXTRACTION,
SAND & GRAVEL, ETC. = 2.6%
CHEMICAL INDUSTRY = 2.2%
OTHER = 4.9%

SURFACE WATER

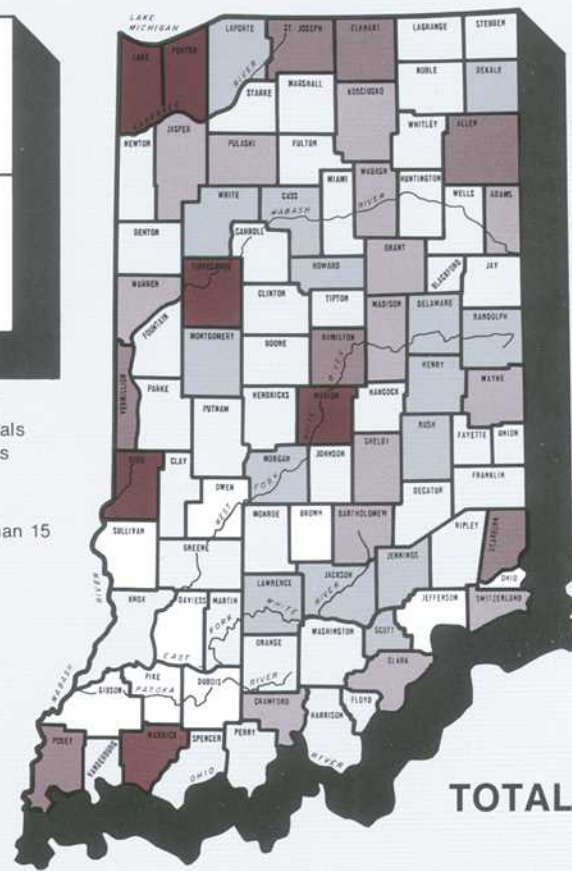
GROUND WATER



Average 1990
Water Withdrawals
(million gallons
per day)



(FIGURE 4)



TOTAL

PUBLIC SUPPLY CATEGORY

AVERAGE DAILY WITHDRAWALS

TOTAL = 621.1 MGD
GROUND = 288.4 MGD
SURFACE = 332.7 MGD

TOP THREE COUNTIES (1990 WITHDRAWALS)

- 1) MARION
- 2) LAKE
- 3) ALLEN

REGISTRATION INFORMATION

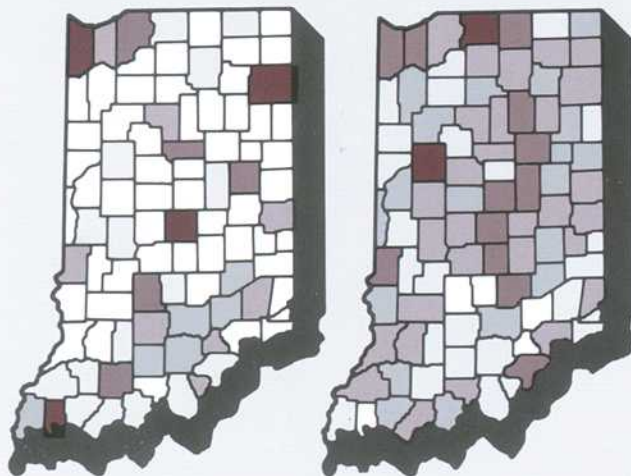
NUMBER OF FACILITIES = 712
NUMBER OF WELLS = 1,905
NUMBER OF INTAKES = 111

WITHDRAWAL INFORMATION

PUBLIC WATER UTILITIES = 97%
MOBILE HOME PARKS, MOTELS,
RESTAURANTS, HOSPITALS,
SCHOOLS, ETC. = 3%

SURFACE WATER

GROUND WATER



Average 1990
Water Withdrawals
(million gallons
per day)



Greater than 15

5 - 15

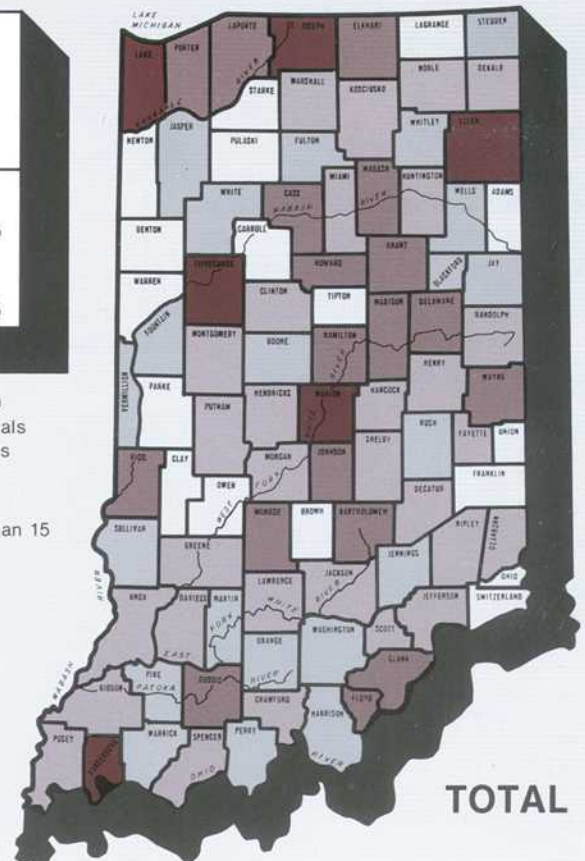
2 - 5

1 - 2

0 - 1

0

(FIGURE 5)



TOTAL

AGRICULTURAL CATEGORY

90 DAY AVERAGE WITHDRAWALS

TOTAL = 239.7 MGD
GROUND = 97.7 MGD
SURFACE = 141.9 MGD

TOP THREE COUNTIES (1990 WITHDRAWALS)

- 1) GREENE
- 2) LAPORTE
- 3) LAGRANGE

REGISTRATION INFORMATION

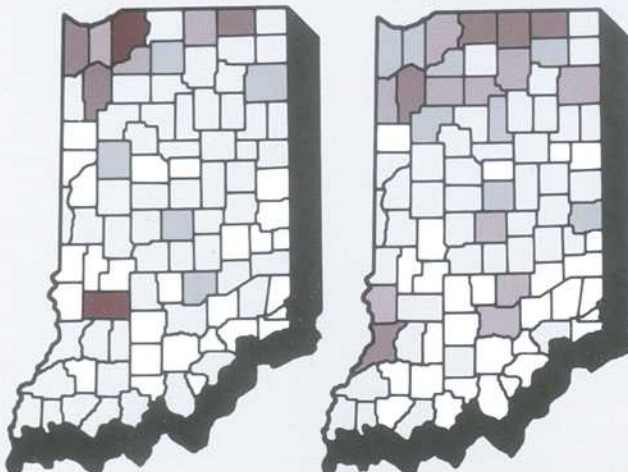
NUMBER OF FACILITIES = 1,675
NUMBER OF WELLS = 1,552
NUMBER OF INTAKES = 792

WITHDRAWAL INFORMATION

AGRICULTURAL IRRIGATION = 50%
AGRIC. FIELD DRAINAGE = 37%
GOLF COURSE IRRIGATION = 13%

SURFACE WATER

GROUND WATER



90-Day Average
Water Withdrawals
(million gallons
per day)



Greater than 15

5 - 15

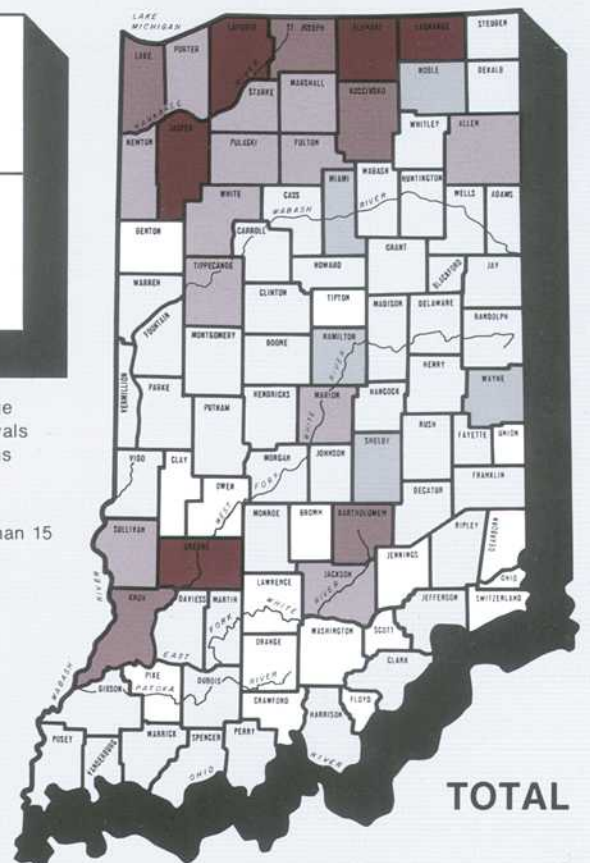
2 - 5

1 - 2

0 - 1

0

(FIGURE 6)



TOTAL